

2005 ACCEPTANCE REQUIREMENTS FOR CODE COMPLIANCE

Hydronic System Control Acceptance Document

MECH-8-A

NJ.10.1 - NJ.10.5

Form 1 of 4

PROJECT NAME		DATE	
PROJECT ADDRESS			
TESTING AUTHORITY	TELEPHONE		
HYDRONIC SYSTEM NAME / DESIGNATION			
		Checked by/Date	Enforcement Agency Use

Intent: Satisfy HVAC water pumping requirements per Section 144(j).

Construction Inspection

- 1 Instrumentation to perform tests include, but not limited to:
 - a. Differential pressure gauge
 - b. Portable temperature probe
- 2 Variable Flow Controls (VFC) and Automatic Isolation Controls (AIC) Inspection

VFC AIC

- ☐ ☐ Valve and piping arrangements were installed per the design drawings to achieve the desired control

3 Supply Water Temperature Reset Controls Inspection

- ☐ Supply temperature sensors have been calibrated
 - ☐ Manufacturer's calibration certificates (attached)
 - ☐ Site calibration within 2° F of temperature measurement with reference meter
- ☐ Sensor locations are adequate to achieve accurate measurements
- ☐ Installed sensors comply with specifications

4 Water-loop Heat Pump Controls Inspection

- ☐ Valves were installed per the design drawings to achieve equipment isolation requirements
- ☐ All sensor locations comply with design drawings

5 Variable Frequency Drive Controls Inspection

- ☐ All valves, sensors, and equipment were installed per the design drawings
- ☐ Pressure sensors are calibrated
 - ☐ Manufacturer's calibration certificates (attached)
 - ☐ Site calibration within 10% of pressure measurement with reference meter

Certification Statement: I certify that all statements are true on this MECH-8-A form including the PASS/FAIL Evaluation. I affirm I am eligible to sign this form under the provisions described in the Statement of Acceptance on form MECH-1-A

Name: _____

Company: _____

Signature: _____

Date: _____

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PROJECT NAME	DATE
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		System ID				
A. System Type		1	2	3	4	5
1	Chilled water					
2	Heating hot water					
3	Water-loop heat pump loop					
4	Other (fill in blank):					
5	Other (fill in blank):					
B. Select Acceptance Test (check all tests completed)		1	2	3	4	5
<input type="checkbox"/>	Variable Flow Control - Alternate 1 (Flow measurement)					
<input type="checkbox"/>	Variable Flow Control - Alternate 2 (No flow measurement)					
<input type="checkbox"/>	Automatic Isolation Controls					
<input type="checkbox"/>	Supply Water Temperature Reset Controls					
<input type="checkbox"/>	Water-loop Heat Pump Controls - Alternate 1 (With Flow Meter)					
<input type="checkbox"/>	Water-loop Heat Pump Controls - Alternate 2 (Without Flow Meter)					
<input type="checkbox"/>	(Pump) Variable Frequency Drive Controls - Alternate 1 (With Flow Meter)					
<input type="checkbox"/>	(Pump) Variable Frequency Drive Controls - Alternate 2 (Without Flow Meter)					

C. Equipment Testing Requirements		System ID				
		1	2	3	4	5
Verify and document the following (check applicable tests)						
NJ 10.1 Variable Flow Control - Alternate 1						
Step 1: Open all control valves.						
a.	Measured system flow (gpm) GPM =					
b.	Design system flow (gpm) GPM =					
c.	System operation achieves design conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 2: Initiate closure of control valves						
a.	Measured system flow (gpm) GPM =					
b.	Design system flow (gpm) GPM =					
c.	Design pump flow control strategy achieves flow reduction requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Ensure all valves operate correctly against the system pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions		Y / N	Y / N	Y / N	Y / N	Y / N
NJ.10.1 Variable Flow Control- Alternate 2						
Step 1: Drive all valves shut and dead head pump against manual isolation valve						
a.	Measured pressure across the pump (ft. H2O) ΔP =					
Step 2: Open manual isolation valve and measure pump DP with control valves closed						
a.	Measured pressure across the pump (ft. H2O) ΔP =					
b.	Both shutoff pressures are within +/- 5% of each other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions		Y / N	Y / N	Y / N	Y / N	Y / N
NJ.10.2 Automatic Isolation Controls						
Step 1: Drive all valves shut and dead head pump against manual isolation valve						
a.	Measured pressure across the pump (ft. H2O) ΔP =					
Step 2: Open manual isolation valve and start/stop each chiller or boiler one at a time						
a.	Verify automatic isolation valve opens fully when respective unit is ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Verify automatic isolation valve closes fully when respective unit is OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: Stop all chillers and boilers on the hydronic loop						
a.	Measured pressure across the pump (ft. H2O) ΔP =					
b.	Both shutoff pressures (1a and 3a) are within +/- 5% of each other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 4: System returned to initial operating conditions		Y / N	Y / N	Y / N	Y / N	Y / N

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PROJECT NAME		DATE				
NJ.10.3 Supply Water Temperature Reset Controls						
Step 1: Manually change design control variable to maximum setpoint						
a.	Reset temperature setpoint	°F =				
b.	Measured water temperature	°F =				
c.	Water temperature setpoint is reset to appropriate value		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Actual water supply temperature meets setpoint		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 2: Manually change design control variable to minimum setpoint						
a.	Reset temperature setpoint	°F =				
b.	Measured water temperature	°F =				
c.	Water temperature setpoint is reset to appropriate value		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Actual water supply temperature meets setpoint		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions			Y / N	Y / N	Y / N	Y / N
NJ.10.4 Water-loop Heat Pump Controls (for circulation pumps > 5 hp) - Alternate 1						
Step 1: Open all control valves						
a.	Measured system flow (gpm)	GPM =				
b.	Design system flow (gpm)	GPM =				
c.	System operation achieves design conditions +/- 5% (Step 1.a./Step 1.b.)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 2: Initiate shut-down sequence on each individual heat pumps						
a.	Isolation valves close automatically upon unit shut-down		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Ensure all valves operate correctly at shut-off system pressure conditions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	System flow reduced for each individual heat pump shut down		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions			Y / N	Y / N	Y / N	Y / N
NJ.10.4 Water-loop Heat Pump Controls (for circulation pumps > 5 hp) - Alternate 2						
Step 1: Drive all valves shut and dead head pump against manual isolation valve						
a.	Measured pressure across the pump (ft. H2O)	ΔP =				
Step 2: Open manual isolation valve and measure pump DP with automatic isolation valves closed						
a.	Measured pressure across the pump (ft. H2O)	ΔP =				
b.	Both shutoff pressures are within +/- 5% of each other		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions			Y / N	Y / N	Y / N	Y / N
NJ.10.5 (Pump) Variable Frequency Drive Controls - Alternate 1 (With Flow Meters)						
Step 1: Open all control valves						
a.	Measured system flow (gpm)	GPM =				
b.	Design system flow (gpm)	GPM =				
c.	Design pump power (estimated by motor HP/ motor efficiency x 0.746 kW/HP)	kW =				
d.	System operation achieves design conditions +/- 5% (Step 1.a./Step 1.b.)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	VFD operates near 100% speed at full flow		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 2: Modulate control valves closed						
a.	Ensure all valves operate correctly at system pressure conditions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Witness proper response from VFD (speed decreases as valves close)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Time for system to stabilize	Min =				
d.	System operation stabilizes within 5 min. after test procedures are initiated		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: Adjust system operation to achieve 50% flow						
a.	Measured system flow (gpm)	GPM =				
b.	Measured pump power at full flow	kW =				
c.	%Power = part load kW/full load design kW (Step 3.b. / Step 1.c.)	% =				
d.	VFD input power less than 30% of design		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 4: Adjust to achieve flow rate where VFD is below min speed setpoint						
a.	VFD minimum setpoint	Hz =				
b.	Ensure VFD maintains minimum speed setpoint		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 5: System returned to initial operating conditions			Y / N	Y / N	Y / N	Y / N

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PROJECT NAME		DATE				
NJ.10.5 (Pump) Variable Frequency Drive Controls - Alternate 2 (Without Flow Meters)						
Step 1: Open all control valves						
a.	Visually inspect a few valves to verify that they open					
b.	Time for system to stabilize Min =					
c.	System operation stabilizes within 5 min. after test procedures are initiated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	VFD operates near 100% speed at full flow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	Measured pressure at loop pressure sensor control point (psi or ft WC)					
Step 2: Modulate control valves closed						
a.	Visually inspect a few valves to verify that they close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Witness proper response from VFD (speed decreases as valves close)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Time for system to stabilize Min =					
d.	System operation stabilizes within 5 min. after test procedures are initiated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	Measured pressure at loop pressure sensor control point (psi or ft WC)					
f.	Measured pressure with valves closed \leq pressure with valves open	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Step 3: System returned to initial operating conditions		Y / N	Y / N	Y / N	Y / N	Y / N

D. PASS / FAIL Evaluation (check one):

<input type="checkbox"/>	PASS: All applicable Construction Inspection responses and applicable Equipment Testing Requirements are complete.
<input type="checkbox"/>	FAIL: Any applicable Construction Inspection responses are incomplete OR there is one or more unchecked box for an applicable test in the Equipment Testing Requirements section. Provide explanation below. Use and attach additional pages if necessary.